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EDITORIAL.

Poultry in Malaya.

During the past eighteen months interest in the subject of poultry keeping in Malaya has become greatly intensified. This is probably largely due to the depression, combined with the growing realisation that poultry and eggs comprise two of the many necessities of life for which Malaya is dependent in a very large and unnecessary degree on foreign sources.

To illustrate how great this dependence is, the following figures taken from Customs returns may be quoted.

Imports of live poultry in 1932 amounted to 928 thousand head valued at $600,000 and imports of dead poultry to 38 tons valued at $44,000; 17 million eggs valued at $300,000 were also imported into Malaya in 1932.

Poultry keeping both by small-holders and also by a certain number of amateurs has been practised in Malaya for many years past, but has never attained the hold which it has procured in other countries. This is partly due to the extraordinary prosperity which has been the lot of the country until recent years, and which has caused it to form a market for the produce of its then less fortunately situated neighbours, but also to difficulties inherent to poultry keeping owing particularly to the inroads of disease.

There appears to be no reason to suppose that Malaya is any worse situated than many of her neighbours in this respect, on the other hand the amount of information regarding the incidence and character of poultry diseases occurring in Malaya, available to the general public, is so small as to be almost negligible.

It is widely realised that in this country, from time to time, heavy toll is likely to be taken of the poultry population by waves of disease, but of the nature of them little or nothing is known. It is in fact customary to speak of the cause of mortality as 'the disease' but no accurate description of symptoms has, so far as is known, been placed on record, while the cause has variously been ascribed to a germ, to weather conditions, and to improper feeding.

In point of fact, reference to conditions in other countries where more is known concerning the incidence of poultry disease indicates that it is highly probable that the position is not due to one disease but to a number, while condi-

tions are probably also adversely affected by other factors, including feeding, housing and weather.

As a first step towards providing readily accessible information regarding the incidence of disease, an article which appears in this number of the Malayan Agricultural Journal has been compiled by Mr. H. D. Meads from current literature giving an account of diseases known to occur in certain other countries which may reasonably be supposed to be prevalent in Malaya. It is believed that the information so provided should prove of value, and while it may require to be supplemented for local conditions it at least affords a basis on which observations can be made and further knowledge accumulated.

It will be seen that the four diseases of the intestinal tract, described in the article, are the most virulent and infectious of any of those which attack poultry, and a careful watch should be kept on the birds so that their incidence may be recognised in the earliest stages. Any individual showing symptoms of diarrhoea together with general ill-health, lassitude and unkempt plumage, should at once be treated as a suspect and be isolated from the remainder of the flock, and, at the same time, daily inspection of all birds should be carried out with increased vigilance.

Although certain medicines are recommend as being of use in the treatment of affected birds, it cannot be too strongly emphasised that there are no cures for intestinal diseases of poultry. As soon as an intestinal disease has been diagnosed, the poultry keeper should immediately destroy all affected birds, the carcasses of which should be burnt or buried deeply in a place which is distant from the poultry run. All individuals subsequently observed among the flock should be thus dealt with at the onset of similar symptoms. By this method alone can the spread of disease be checked.

At the same time, by reason of the fact that the casual organisms are voided by diseased birds in large numbers, the ground on which such birds are kept becomes a source of infection and it is important that, whenever possible, healthy birds should not be allowed access to such ground for a period of 6 months.

Although the common practice in Malaya of allowing birds to have free range is a desirable one from the point of view of economy, both in housing and in diet, it renders difficult the segregation of infected birds and the enclosing of areas of infected ground. It is advised that a small wired-in house and pen should be erected for the isolation of sick birds where they may be kept under more direct supervision and also be prevented from fouling the common area.

Once the presence of any infectious disease has been established, and the affected birds removed to the isolation run pending their destruction, this area of ground should remain shut off from the remainder of the flock for the above mentioned period of 6 months or more, the house being thoroughly washed with a strong disinfectant.

A small enclosed run should also be set apart for the rearing of newly hatched broods during the first few months of life on all areas where diseases,

intestinal parasites or gape worms have made their appearance among adult birds, in order that the chances of infection of the young chickens may be minimised.

The Department of Agriculture will welcome any observations on diseases by poultry keepers in Malaya, since it is urgently required to widen the scope of the information at present available on this important subject.

Coconut Seed Selection.

The importance of using good seed, when planting an area with any crop, is well recognised. The up-to-date planter endeavours to use only the best seed of suitable strains, with the hope of securing better growth and a higher yield than is likely to be obtained through the use of inferior material. In the case of most of the annual crops, and many of the perennial crops, in every part of the world, proved seed naturally is planted in preference to any other.

When it is taken into consideration that the coconut palm is perennial, and that its economic life may exceed 60 years, the advantage of planting selected seed is evident. Although it must not be assumed that nuts from a high yielding palm will produce high yielding progeny under all conditions, properly conducted selection should result in the establishment of a better stand of palms likely to give satisfactory returns.

Work on the production of a pure strain of high yielding palms is at present in progress at the Government Coconut Station, Klang, but results from this work are not likely to be available for a considerable number of years. It should be noted that there is no "short cut" towards the production of high yielding palms, by vegetative propagation.

The methods adopted by Mr. A. C. Smith, the writer of the article on practical seed selection of coconuts included this number of the Journal, are considered likely to give satisfactory results, in the light of present knowledge, since they are applicable on a commercial scale, and it is hoped that this account of a practical scheme, which marks a definite advance in coconut planting methods, will be informative and helpful to those interested in the coconut industry.

Original Articles.

DISEASES OF POULTRY AND NOTES ON POULTRY REARING.

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Disease is one of the most acute problems which besets the poultry keeper in all parts of the world and hitherto the information concerning it which has been generally available in Malaya has been remarkably inadequate.

Indeed, the belief that the mortality of poultry is generally attributable to only one form of disease is not uncommonly held in this country, whereas in actual fact there are at least six diseases which are the frequent cause of heavy loss of life.

In the case of the majority of the more serious poultry diseases, particularly those caused by specific micro-organisms which attack the intestinal tract and whose common symptom is acute diarrhoea, prophylactic measures alone are recommended, together with the immediate isolation and destruction of affected subjects. No reliance can be placed on the use of medicinal cures for such diseases; it remains only for the poultry keeper to endeavour to maintain the health of his flock through careful feeding, housing and sanitation, and to maintain rigidly a constant observation of all birds so that individuals showing signs of illness may be segregated at an early stage, thereby lessening the chance of a rapid spread of infection.

The importance of an early recognition of symptoms cannot be too strongly emphasised, and for such recognition it is essential that a knowledge of the common poultry diseases be acquired.

An effort has been made to compile the information contained in contemporary publications of other countries on the subject of such diseases of poultry as are of known or suspected occurrence in Malaya.

For the purpose of assisting in their recognition these ailments are grouped into those of the intestinal tract, diseases of the digestive tract, diseases of the respiratory organs, and external parasites. Notes on the treatment of wounds and fractures, general sanitation, housing and feeding are also included.

DISEASES OF THE INTESTINAL TRACT.

Intestinal diseases, other than constipation, may be caused either by bacterial or protozoan organisms or by worms. In the case of infection by micro-organisms, bacteriological examination alone can determine which is responsible.

Constipation.

This is commonly caused by errors in diet such as too heavy grain or dry mash feeding or insufficient green food. Droppings are abnormally dry, and when excreting there is a noticeable straining on the part of the bird.

Treatment :—Treatment consists in the regular monthly administration of epsom salts at the rate of 2 ozs. per 25 birds dissolved in half a gallon of drinking water or added to the wet mash.

Simple Diarrhoea.

By this is meant the frequent passing of liquid droppings not caused by any infectious organism. Decomposing food, foul drinking water, unsuitable diet, such as an excess of meat or fish constituents, or exposure to cold and the presence of worms in the intestines are among the most frequent causes of simple diarrhoea. This condition predisposes the subject to infection by specific intestinal organisms and should therefore be guarded against, and treated immediately on its occurrence.

Treatment :—The treatment which is recommended is the administration of sulphocarbolates of calcium, zinc and sodium in equal proportions, five grains of which mixture is dissolved in a pint of water supplied as a drink or mixed with the mash. Potassium permanganate, 1 oz. to 4 gallons of water is also of use as an intestinal disinfectant. The supply of soft wood-charcoal, broken into small pieces the size of a pea, in a receptacle to which the bird may have constant access, is also indicated for diarrhoea and digestive disorders.

The poultry keeper should be warned, however, that since diarrhoea is a symptom of the virulent and infectious intestinal diseases, the behaviour of any affected subject should be carefully watched for any accompanying symptoms of general ill health, and the bird should be immediately isolated from the flock if any such symptoms appear.

Bacillary White Diarrhoea of Chicks.

This disease is of common occurrence in Europe, America and Mauritius, and although bacteriological examination, which is essential for its diagnosis, has not been carried out in Malaya, it is believed to be present in this country.

It is primarily a disease of young chicks. Birds which survive the disease generally carry the infection in their ovaries as adults, and can transmit it to their progeny by means of infected eggs. The disease is also disseminated through the agency of the droppings of carrier birds.

Symptoms :—Newly hatched birds from 1 to 4 days old are the most susceptible to this disease, and when a number of chicks in a brood are seen to be suffering from diarrhoea, with a white or yellowish coloured excrement, and have a drowsy appearance and a drooping carriage of the wings, the presence of bacillary white diarrhoea should be suspected.

Treatment:—It is strongly recommended that all such birds should be destroyed immediately, since not only is the rate of mortality very high but, as above mentioned, the survivors are likely to be carriers of the disease and therefore a source of danger to the flock.

In Europe it is advocated that all the stock birds should be tested by bacteriological examination in order to determine and destroy those which are the source of infection, but in Malaya, where such facilities are not at present available, it would be well to destroy any hen which is seen to rear infected broods.

Healthy birds which have had access to the contaminated pen should be moved on to clean ground and the infected pen should be dressed with quicklime and left vacant for at least one month. Houses and utensils which have had contact with diseased birds should be sterilised with a strong disinfectant.

Although the use of intestinal antiseptics is recommended by some authorities, these should not be regarded as curative but merely as prophylactic measures. In flocks where bacillary white diarrhoea has made its appearance, healthy birds may with advantage be given a solution of 5 per cent. sulphate of iron and tincture of catechu* in the proportion of one teaspoonful to 2 pints, in their drinking water on alternate days for a period of 2 weeks whenever cases of bacillary white diarrhoea or allied diseases have made their appearance.

Fowl Typhoid.

This highly infectious intestinal disease, which is also caused by a bacterial organism, is said to be world-wide in its distribution. It is seldom found to attack any but adult birds. The organism is voided in large numbers by infected birds and is transmitted by contact, contaminated drinking water and food containers, and by infected ground.

Symptoms:—Loss of appetite, a tendency to mope, drooping of the head and wings accompanied by the passing of liquid sulphur-coloured faeces are the general preliminary symptoms of this disease. As the disease advances the bird may become partially comatosed with the head fallen forward and the beak touching the ground, eventually the affected subject lies on its side with the head curved under the breast. The face, comb and wattles are pallid in colour and the body of the bird is unduly hot to the touch owing to its high temperature. Death generally supervenes after 3 to 4 days of coma.

Treatment:—All suspected individuals should be isolated as soon as the above symptoms are observed, and it is advisable to destroy all such birds immediately after the death of any of their number and burn or bury deeply all carcasses. If possible, healthy birds should be removed to clean ground while contaminated runs are dressed with quicklime at the rate of about 1 ton per half acre. All houses and utensils must be cleansed with a strong disinfectant. It is advisable to adminster epsom salts to the flock.

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* Tincture of catechu:—20 parts cube gambier, 5 parts cinnamon bark, 100 parts alcohol (45 per cent.).

Fowl Cholera.

Although this bacterial disease is rare in Great Britain, it is not infrequent on the Continent of Europe and in America, it is also known to occur in Mauritius, and at least one case has been definitely diagnosed in Malaya.

It is highly infectious in its nature and may attack almost all types of domestic birds. It is communicated by the droppings which infect the soil and pollute the drinking water and food. The bacillus does not form spores and is easily destroyed by disinfectants or exposure to air. Fowl cholera causes a very high rate of mortality and its incubation period is seldom longer than 24 hours.

Symptoms :—Diarrhoea may not appear in the early stages of this disease, but when it manifests itself the droppings are liquid, yellow or greenish in colour and highly foetid. The progress of the disease being very rapid, death often supervenes with great suddenness and without warning. Birds may be found dead which an hour earlier appeared to be in perfect health. In cases where sudden death does not occur, the affected subjects appear very dispirited and there is a marked tendency to remain motionless with the feathers erected and the wings, head and tail drooping; when walking, the bird's gait is very unsteady. Congestion of the comb and wattles, which take on a violet colouration, is a characteristic symptom which is rarely absent both before and after death. The lungs are frequently affected, this being manifested by raucous breathing which is easily audible from a little distance.

Treatment :—Since this disease is a very infectious one, poultry yards being, not infrequently, entirely depopulated by it in a period of from 2—3 days, it follows that the strictest precautions are necessary the moment its incidence is suspected. The immediate removal of all healthy birds from infected ground and the careful disinfecting of all houses and utensils is of the utmost importance in checking the spread of this disease. The carcasses of all dead birds must, of course, be destroyed by burning or else be buried deeply in the soil in a distant locality. The range should, if possible, be changed and the healthy birds given epsom salts; an intestinal disinfectant, such as described earlier, should be added to their drinking water.

Coccidiosis.

One further disease of the intestinal tract caused by the attack of a micro-organism, which is described hereunder, is due to the presence of a species of protozoon, the accurate recognition of which again calls for microscopic examination.

This disease is the cause of considerable mortality in young chicks but in adult birds it is more commonly a chronic condition.

Since this disease is of extremely frequent occurrence in Mauritius there is every likelihood of its being present in Malaya.

From the similarity of its symptoms in chicks it is frequently confused with bacillary white diarrhoea. The only distinguishable feature is the fact that, in coccidiosis, death does not generally occur before the seventh day after hatching, whereas in bacillary white diarrhoea, mortality is at its highest among birds of from 1 to 4 days old.

Evidence that this disease can be passed to the chick through the egg, as in bacillary white diarrhoea, is lacking. Infection is spread by contamination of the soil by adult carriers or by a previous infected brood.

This protozoon, which forms egg bodies, is not communicable at the time it is evacuated by the bird but after a few days of ripening becomes active once more. Spores of coccidiosis can remain dormant in the soil for very long periods.

In consideration of the fact that an infected bird evacuates great numbers of egg bodies of coccidiosis daily, it will be realised that runs become rapidly contaminated and it is of primary importance that the isolation of such infected ground be undertaken without delay.

Symptoms.—Similar general symptoms of ill-health are observable in this as in other intestinal diseases, that is to say, the bird becomes listless and disinclined to move about. Diarrhoea, which does not generally commence until within four days of the onset of the disease, is liquid, glairy and often tinged with blood. General weakness increases until the bird is unable to move without falling. The death rate is generally at its highest on about the tenth day after the chick's emergence from the egg. Such birds as do not succumb by the fifteenth day usually survive but their development is considerably retarded by the effects of the disease.

Treatment :—The only measure which can be recommended is the immediate destruction of all affected birds as soon as the presence of coicidiosis is suspected.

General Prophylactic Measures for Intestinal Diseases.

1. No eggs should be used for hatching except those which come from birds of proved good health.
2. All eggs should be set under healthy birds and on clean freshly dried grass or similar material.
3. The materials used in the nest box should be renewed whenever they become soiled.
4. Young chicks should be reared on ground to which no adult bird, other than the parent hen, has access, the soil having been first disinfected with a suitable preparation such as a solution of tuba root—1 lb. to 10 gallons of water—or with boiling water.
5. Drinking water and food must be kept in receptacles so placed that birds cannot enter and foul them.
6. All houses should be cleansed once a month with a solution of disinfectant, such as "Izal", ½ oz. to 1 gallon of water.

7. The administration of an intestinal disinfectant, in the drinking water, such as has been earlier described, is to be recommended at intervals of about a fortnight.

8. The flock must be carefully observed daily for any signs of ill health.

9. Immediate isolation of all birds suspected of being infected with an intestinal disease is of the greatest importance.

10. Birds which are observed to suffer from an acute affection of the intestines and exhibit any of the symptoms already described, should be destroyed and their carcasses be burnt or buried deeply.

11. Ground to which diseased birds have had access is certain to be infected with the causal organism and healthy birds should not be allowed entry to such areas. Infected ground should be allowed to lie fallow for several months and if possible be treated with quicklime.

12. It must be remembered that errors in diet predispose the intestinal tract of poultry to the attack of disease germs, therefore correct diet does much towards reducing the occurrence of disease.

Intestinal Worms.

There are several species of intestinal worms which parasitize fowls. When numerous, these worms may interfere with digestion and nutrition producing stunted growth and loss of weight and even, in young birds, not infrequently causing death. Since the eggs of worms are passed out of the body of their host and are readily picked up by other birds, the importance of isolating newly hatched chicks from adults will again be perceived.

Symptoms:—Indolence, lack of appetite, loss of weight, diarrhoea and an unkempt appearance of the plumage are common signs of the presence of worms. The progress of the affection is slow but careful observation will disclose parasitized birds in time to allow of a cure being effected.

Treatment:—One teaspoonful of epsom salts dissolved in warm water before mixing with a very small quantity of mash, should be allowed per bird and given in the evening. On the following morning turpentine mixed with an equal quantity of olive oil should be poured into the mouth in a dose of from 1 to 2 teaspoonfuls per bird, according to age. This is particularly beneficial in cases of tape-worm parasitization.

An alternative treatment is to mix oil of chenopodium with a moist mash feed at the rate of one teaspoonful of oil for every 12 birds.

Tobacco is also recommended as a reliable cure and may be employed in the following manner:—2 ozs. of finely chopped dried tobacco leaf for every 12 birds should be steeped for 2 hours in sufficient water to cover it and the whole should be mixed with half the usual ration of mash. This treatment should be repeated after the lapse of 10 days.

All vermifuges are more effective if administered when food has been withheld on the day previous to treatment.

A few hours after the birds have been given a vermifuge, a solution of epsom salts, should be given in the manner described above.

Since the foregoing vermifuges are poisonous it is as well to test their effect on a few birds before administering to the entire flock.

Prophylaxis :—The eggs of intestinal worms are voided from time to time by infected subjects, and, in cases where their prevalence is found to affect seriously the health of the flock, it is advisable to remove birds to a fresh plot of ground wherever possible, and to allow the infected area to lie fallow for 1 year or more, or to dig up and remove the surface soil.

Crop Binding.

Crop binding is not a disease but a purely mechanical affection of the alimentary tract.

Birds in which the crop has become so overloaded and swollen, owing to its exit being totally or partially stopped, as to cause considerable discomfort should be treated as follows :—The bird is held by the feet and the crop gently but firmly massaged with the fingers until such liquid as has accumulated in the crop is expelled from the mouth. The bird should then be enclosed in a separate coop and fed only on soured milk for two to three days. Milk may be soured by addition of a small quantity of rennet : sour milk has the effect of dissolving fibrous material which blocks the exit of the crop and forms at the same time a nutritious diet for the bird.

If the obstruction is of a non-fibrous nature a surgical operation will be necessary.

Crop binding is most frequently caused by swallowing lengths of hard fibrous grass, therefore all grass to which the birds have access, more particularly in the case of young chicks, should be cut into short pieces.

DISEASES OF THE RESPIRATORY SYSTEM.

Roup.

This infectious disease is a form of catarrh, characterised by a foetid discharge from the nasal passages which eventually become gummed up by mucus. In acute cases roup can become fatal.

Chills due to damp and draughty houses are predisposing causes of roup.

Symptoms :—Sneezing, inflamed eyes accompanied by swelling of the face just below the eyes and laboured respiration through the mouth are indicative of roup. The affected bird has a depressed appearance, rough plumage and is lethargic in habit.

Treatment :—Affected birds should be isolated and all houses and yards disinfected. The flock should be watched for further incidence of the disease.

The nostrils of diseased birds should be syringed with a solution of bicarbonate of soda in the proportion of half a teaspoonful to a teacup of warm

water. The bird's head should be held downwards and the liquid forced through the nose until it is expelled from the mouth. This should be followed by a further warm injection of eucalyptus 30 drops, thyme oil 30 drops, menthol crystals 10 grains, oil petrol 2 ozs. The treatment should be repeated three times a day accompanied by epsom salts in the drinking water* and a soft diet.

Broncho-Pneumonia.

This affection of the lungs is of most common occurrence among birds which are slow in forming plumage such as the Malayan, Plymouth Rock and Orpington breeds. Unhealthy conditions such as dampness and draughts are the usual cause of broncho-pneumonia.

Symptoms:—Partial or total loss of appetite accompanied by constipation and thirst. The bird tends to stand apart from the flock with ruffled feathers and has a very noticeable difficulty in breathing. The affected bird coughs occasionally in an effort to clear the air passages. Death supervenes rapidly.

Treatment:—Isolation of the affected subject is not essential since the disease is not infectious, although until its diagnosis is determined it is as well to remove sufferers from the flock: this moreover facilitates treatment. Nasal injections similar to those described for roup are advised with the addition of a teaspoonful of a mixture of equal parts of pulverised ginger, brandy and honey with 1—2 grains of quinine sulphate and 2—5 drops of ipecacuanha or 1—2 drops of tincture of iodine.

Fowl Pox or Avian Diphtheria.

It has been found in Mauritius that all breeds of poultry are not equally susceptible to this disease, the local and Malayan types being comparatively immune.

Fowl pox, which is a contagious affection of the mouth, nose and eyes is to be distinguished from roup by the fact that lesions are formed on the membranes of these organs and/or on the comb and wattles.

It has been proved that there are no "carriers" of fowl pox, therefore the introduction of the disease may be prevented by the isolation of any new additions to a flock for a period of 1 month, during which time the comb and mouth should be examined for any signs of fowl pox lesions. The disease is only transmitted through direct contact on a portion of abraded or wounded skin.

Symptoms:—General preliminary symptoms of ill health accompanied by sneezing or an occasional cough are followed by the formation of greyish or yellowish membranes in the mouth and throat, or by a purulent discharge from the nose and eyes with a glueing together of the eyelids.

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*The following internal disinfectant is beneficial in the treatment of colds and roup:—1 oz. of copper sulphate is crushed and dissolved in 19 ozs. of water, the clear liquid is decanted and used in the proportion of 1 teaspoonful to 1 gallon of drinking water.

In the later stages of the buccal form, the false membranes develop to such an extent that the bird is unable to close its mouth; the accumulation of lesions at the opening of the trachea causes death from suffocation generally within two to three weeks from the onset of the symptoms.

When the comb and wattles alone are affected, wart-like nodules appear on the featherless skin of the head. If this form of fowl pox does not spread to the mouth, the bird's general health is not affected and it may recover within from two to four weeks.

Treatment :—Although in Europe a vaccine for the prevention of fowl pox has been discovered, this preparation is not at present available in Malaya.

There are no methods of economical treatment which can be recommended. The disease invariably spreads slowly and can easily be eradicated from a flock if affected birds are destroyed while the disease is in its early stages and disinfection, together with careful observance of all contacts, is carried out.

Gape Worms.

These are a frequent source of mortality in young birds up to 3 or 4 months old. The symptoms, which do not appear until the bird has been infected for ten days, are a cough or sneeze with frequent shaking of the head followed by a stretching of the neck with the beak open in an attempt to take in more air.

It should be noted that this symptom also occurs in cases of affections of the lungs.

These worms, which vary from 1/5 in. to 1 inch in length, and are bright red in colour, attach themselves to the lining of the wind pipe and can be frequently seen if the bird, with its beak open and neck outstretched, is held up to the light. The worms may eventually cause death from suffocation by obstruction of the passage.

Adult fowls seldom if ever succumb to the effect of this worm as the birds are able to expel the parasite by coughing.

Treatment :—It is advisable to kill and burn the carcasses of all young chickens which are attacked, in order to avoid the spread of the worm from dissemination of its eggs. All birds should be immediately removed from an infected pen, and the ground should be disinfected with a solution of tuba root or other insecticide in order to destroy the earth worms which are considered to be hosts of the gape worm. There are various mechanical methods for removal of worms from the wind pipe but these cannot be recommended as being very satisfactory.

As has already been stated, older birds should never be kept in a pen with young chickens, as they are liable to infect the latter not only with gape worms but with many other parasites and diseases.

EXTERNAL PARASITES OF POULTRY.

Favus or White Comb.

This disease is due to a fungoid parasite which primarily attacks the comb and other featherless parts of the head. It is highly contagious and spreads rapidly in a flock. The disease can be transmitted to human beings and this should be borne in mind when treatment is undertaken.

Symptoms.—Small irregular spots form on the comb or wattles which later coalesce into a yellowish grey crust. When the feathered areas of the head and neck become involved the disease usually ends fatally.

Treatment.—Immediate isolation should be carried out. The affected parts should be bathed with warm water and soap, fomented, the crusted patches being removed as far as possible with a blunt-edged instrument, and smeared with sulphur ointment or an ointment of 5 per cent. nitrate of silver in vaseline. Any bird on which the disease has spread to the feathered parts before treatment is undertaken should be destroyed.

Insect and Mite Pests.

Fleas, bugs, lice, ticks and mites are pests which attack poultry. Those which suck blood are the cause of debility and the biting insects are a source of constant irritation and restlessness. The portions of the body most favoured by these parasites are the head, neck, rump and under the wings.

One type of mite is often the cause of feather eating, as the bird pulls out the quills in an endeavour to alleviate the irritation.

Control Measures for External Parasites.

Absolute cleanliness of the birds' quarters and nest boxes is essential for the control of these pests. Apart from the routine cleaning of droppings and other dirt, fowl houses should receive a thorough cleansing at least every six months when all moveable parts should be taken out and scrubbed with a strong disinfectant such as 5 per cent. Izal or Lysol solution the walls and floors being washed with a similar solution.

An emulsion of paraffin (3 parts soft soap in 15 parts hot water and 70—100 parts paraffin added gradually while stirring) is very efficient as a spray for houses infected with insect pests.

Parasitized birds may be dipped in a solution of tuba root (1 lb. to 10 gallons water) the feathers being manipulated by hand to allow of the solution reaching the skin. A hot day should be chosen for the carrying out of this treatment to enable the birds to dry quickly.

WOUNDS AND FRACTURES.

Wounds should be washed in water and treated with tincture of iodine. Wounds of birds, unless very serious, generally heal with great rapidity.

In cases of fracture of the leg the broken bones should be placed in perfect apposition. A thin layer of cotton should be bound round the leg, care being taken that the circulation is not interfered with, and three wooden splints of the requisite length applied and fixed in position by a bandage saturated in glue, which, after hardening, holds the parts firmly in position. The injured bird should be confined to a small solitary run for fourteen days, after which the bandage may be removed.

The bird should remain confined for a few days longer before rejoining the flock.

THE MOULT.

Although the moult is a normal and not in any way a disease condition, in consideration of the fact that it is a period during which poultry is particularly susceptible to illness it is thought that remarks on their care during the moulting season will not be incompatible with the purpose of these notes.

The feathers contain some 4 to 6 per cent. of nitrogen and a high proportion of phosphorous and other minerals which are derived from the food; it follows therefore that such minerals should be provided by a full and carefully balanced ration during the period of refeathering. An unsuitable diet has the effect of prolonging the period of the moult, thereby increasing the period when the bird is most vulnerable to the attack of diseases, more especially those of the pulmonary system. Adult birds are particularly susceptible during this season, and it is essential to ensure that their housing is dry and free from draughts and that their food supplies the necessary nourishment.

It is recommended that a pinch of sulphur sublimate or iron sulphate per bird be added to their drinking water, or sulphuric acid in the proportion of 1 dram per pint of water.

The protein content of the feed should be raised during the moulting season by increasing the proportion of fish, meat and vegetables.

NOTES ON GENERAL SANITATION.

It has already been stated that no reliance can be placed on any medicinal cures for poultry diseases; it should therefore be the object of all poultry keepers to assure that conditions conducive to ill health are avoided. Dirt, damp, draughts and poor feeding are the principal factors which predispose birds to the incidence of disease. Well drained, undulating soil of a sandy nature is

the most suitable for a poultry yard. Dry, draught-free houses, of adequate size in which the ground is raised above the general level, the flooring being removable and where all parts are readily accessible for cleaning, are essential.

Housing.

In deciding upon the type of house to be erected due regard must be made to the position in which it will be placed. The type of house which is suitable for an exposed position would probably prove too stuffy if placed in a sheltered situation, while the converse of course is also true. The suitability of a house must be decided by observation of the fowls and alterations made accordingly if found necessary.

The behaviour of the birds at night is a good indication of the efficiency or otherwise of the ventilation. If the birds are seen to huddle close together in groups it is a sign that they feel cold and the house is either damp, draughty or both: if they space themselves evenly on the floor or perches it indicates that the ventilation is suitable. With efficient ventilation there is practically no smell noticeable on opening the fowl house in the morning.

The floor space allowed per bird in the house will depend upon whether additional day shelter is provided. If the house is only to be used for sleeping it may be much smaller than if it is their only shelter. For a house used solely for sleeping purposes 1½ to 2 sq. ft. of floor space per bird is required, while if the house is to be used by fowls in the daytime also, the allowance per bird should be increased to 3—5 sq. ft. or more per bird.

If permanent fowl houses are erected, it is desirable that the walls and roof should be as smooth as possible to faciltate cleaning.

If perches are provided they should all be on the same level otherwise there is perpetual quarrelling amongst the birds owing to competition for the highest perch. Perches should be of wood, two inches square, with rounded top edges. They should not be nailed in position but tapered at the ends and fitted into tapered slots. This arrangement while keeping the perch quite firm, allows it to be readily removed for cleaning should the red mite make its appearance. The length of perches should be from 6 to 12 inches per bird according to size of the birds.

A droppings board, covered with sand or dry powdered earth, should be fitted six inches or more below the perches. The droppings should be removed daily.

NOTES ON FEEDING.

While systems of feeding poultry are numerous, it may confidently be asserted that there is no one method that can claim to be correct to the exclusion of others. Local conditions must be considered and the greatest use of inexpensive foodstuffs be made.

Feeding of Free-range birds. Birds which are kept on a free range, as in Malayan kampongs, require smaller quantities of artificial feeding stuffs than

birds which are confined to pens. Grubs, insects and worms will to a great extent fulfil the birds' meat requirements and the natural green-food available to them is not likely to need augmenting.

Birds kept on a free range might with advantage be supplied with a wet mash in the morning, such as is described below. Grain feed, as in the subsequent paragraph under this heading, must of course be given to them in the evening.

Wet mash is fed to poultry in a limited quantity which should be consumed by the birds within half an hour.

Among the ordinary constituents of kitchen refuse which may with advantage be given to poultry in the form of a wet mash are fish heads, tails and bones, scraps of meat and meat bones, parings of vegetables, cabbage, lettuce and spinach leaves and the bud or "umbut" of the banana stalk removed after fruiting. The fish and meat materials, after the removal of all fat, should be boiled* and then minced or broken up by pounding and mixed with from 10 to 15 times their weight of bran, cooked rice or stale bread crumbs and fed to the birds from a trough. If salt fish is used it should be soaked in hot water just before it is required in order to remove the salt. All vegetable remnants should be placed in cold water until required and only chopped up immediately before feeding. In the case of fibrous vegetable material, care should be taken to cut it into small pieces to prevent the birds from becoming crop-bound by portions of long hard fibre. No stale or decomposing vegetable or animal matter should ever be given to the birds as such is conducive to stomach trouble.

The fat removed from meat remnants should be melted and poured over bran or rice refuse and carefully mixed. This addition of fat is only suitable for young stock, which have a poor growth of feathers, birds which are being fattened for the table or for moulting birds. An excess of fat reduces fertility of the eggs of breedings birds as well as the egg production of layers.

Feeding of birds kept in runs:—Although there are many standard works on intensive poultry feeding in other countries, it is considered that their recommendations if adopted in Malaya might prove too expensive to be profitable.

The importance of a correctly balanced diet is obvious if the best results are to be obtained.

Experience in Malaya has proved the following system of feeding to be very successful:—

1. A dry mash placed before the birds in sufficient quantity for consump- during the day.
2. An evening feed of grain because this needs longer time for digestion and the birds retire satisfied at night.

A dry mash which is composed of several foods, must be given to the birds well mixed and in a fine state of division. If it is not in a finely

* Boiling is only recommended for such materials as cannot readily be mixed otherwise, since the cooking of food may lessen its nutritive value.

ground condition, the birds will pick out such portions as they prefer and so fail to get the balanced ration. The work of grinding is facilitated if all materials are well dried beforehand.

Finely ground foods should not be kept for any length of time as they lose a certain amount of their value and decompose more rapidly. When it is found advisable to prepare a small stock, the finely ground food should be dried in the sun for two or three days before storage. Mash can be ground up either between granite stones or in a large coffee mill.

Mashes should always be fed to the birds in troughs and never on the ground. The trough in which dry mash is provided throughout the day must be protected from the rain, and should have wire partitions to prevent the birds from entering the trough and fouling its contents.

The following dry rations, in parts by weight, have been found to be successful for poultry in this country :—

For young chicks.

11 parts padi, ground fine, husk discarded :
4 parts soya bean cake or groundnut cake, ground fine :
4 parts whale meat meal :*
3 per cent. of total (by weight) minerals (3 parts steamed bone flour, 1 part salt, 1 part powdered oyster shell)
2 per cent. of total (by weight) red palm oil.† (This should be added after the other constituents have been ground and mixed).

For growing chicks.

23 parts padi, ground, husks discarded :
3 parts soya bean or groundnut cake :
3 parts whale meat meal :
2 per cent. of total (by weight) minerals (as above) :
1 per cent. of total (by weight) red palm oil.

For laying hens.

4 parts padi, ground, husks discarded :
2 parts soya bean or groundnut meal, ground :
1 part whale meat meal :
2 per cent. of total (by weight) minerals (as above) :
1 per cent. of total (by weight) red palm oil.

The dry mash, as previously stated, is kept before the birds all day.

In addition to the above dry mash systems a limited quantity of wet mash, such as is described in an earlier paragraph, may be supplied to the birds in the morning.

* Supplies of whale meal can be obtained locally in 7 lbs. tins and 28 lbs., 1 cwt. and 2 cwt. bags. When ordering, it is essential to state if it is required for poultry feeding so that only fresh meal be supplied.

† Red palm oil which is stated to be richer in Vitamin A than the more expensive cod liver oil is particularly beneficial in strengthening the pulmonary system of poultry.

Grain.—Padi which must be fresh and free from moulds, should be supplied to the birds in the evening at the rate of about 1½ to 2 ozs. per bird, or in an approximately equal weight to that of the total dry weight of mash actually consumed during the day, part in a trough and part scattered on the ground.

For feeding to young birds all grain should be broken to a suitable size as the birds are unable to husk it for themselves.

Green gram, or kachang hijau, is greatly liked by poultry and can be mixed in the proportion of 1 part to 5 parts of padi. The grain feed must be supplied in definite known quantities as this diet can be used to regulate the condition of the birds; thus if they show a tendency to become too fat, the evening grain ration may be increased, when the birds will be found to require less mash during the following day. Similarly if the birds are required to put on flesh the grain supply should be reduced and the mash feed increased proportionately.

Testing the Fatness of Poultry. It must be borne in mind that both under-nourished and over-fed hens cease to lay.

An under-nourished hen is over-eager with food and its breast bone when felt forms a projecting ridge with little flesh covering it.

The best method of testing the fatness of a bird is to hold it with both hands facing towards one, sliding the right hand along the ribs until the tips of the fingers rest on the abdomen just below the breast bone. In a thin bird, a hard lump about the size of a nutmeg, which is the gizzard, will be easily felt, whereas considerable pressure will have to be exerted on a fat bird before the gizzard is located. The handling of birds should preferably be carried out after dark with the aid of an electric torch, the birds being disturbed as little as possible.

Drinking Water.

Birds should have access to fresh, clean water at all times; dirty water is a frequent source of introduction of various diseases of poultry.

Drinking water should be replenished at least twice a day, being placed in receptacles that are thoroughly cleaned daily and kept in a shady situation.

It is preferable to supply drinking water to fowls in glazed earthenware receptacles rather than in metal ones, more especially when chemicals are to be added to the water.

Mineral Supply.

The necessity of providing poultry with an adequate supply of lime for shell production, and of grit to assist digestion, is obvious and has long been recognised. It has been proved that mineral deficiency is the cause of certain ailments in poultry.

Grit is necessary to poultry and replaces the action of teeth in reducing grain and other food in the crop to a sufficiently fine state so that the nourishment can be absorbed by the digestive organs. The grit should be hard—the harder the

better—and have sharp angles. A stone which readily breaks into thin flat flakes should be avoided as it is liable to cause internal wounding. Sand, which can be washed on ordinary wire "mosquito" netting so that the small particles and earth are extracted, is readily obtainable in Malaya and will be found satisfactory.

Poultry obtain a certain amount of lime from their foodstuff, but in many parts of Malaya, where the soil may be deficient in lime, it is probable that the birds will obtain an inadequate supply resulting in thin or soft-shelled eggs.

Broken oyster and other shell, sand or limestone are the more usual alternative sources of lime for feeding to poultry. The choice of the particular source of lime will, therefore, depend upon that which is most readily procurable.

It should not be forgotten that certain waste products are suitable for use in this connection *e.g.* unburnt stone from lime kilns, old mortar from buildings. *On no account should unslaked burnt lime be given to poultry.*

A suitable mineral mixture, which may be used alternatively to that described on page 262, and added daily to the dry mash, is one of equal parts of lime, salt and charcoal of which 1 to 3 per cent. (by weight of the entire mash) should be mixed with the mash. Salt must be always used with caution as 3 per cent. of salt is generally fatal to poultry.

In conclusion it may be said that while suitable diet and good sanitation cannot be expected to immunize poultry from disease, which may be introduced by various means, much can be done towards minimising the effects of disease.

Constant observation of the flock, and immediate removal and destruction of birds which are suspected to be suffering from any infectious disease, will help to prevent the loss of an entire flock, a happening which is a not infrequent experience of the poultry keeper in Malaya.

ACKNOWLEDGMENTS.

The foregoing notes have been compiled from information contained in the following publications :—

"Some Diseases of Poultry", Bulletin No. 6. Published by Ministry of Agriculture and Fisheries—London.

"Notes sur I' Elevage des Oiseaux de Basse-cour et du Lapin", by Donald D' Emmerez de-Charmoy, I.S.O., Assistant Director and Entomologist, Department of Agriculture, Mauritius.

"Poultry Diseases", by B. F. Kaupp, B.S., M.S., D.V.M. Published by Baillière Tindall and Cox, London.

The sections on housing and feeding are based on information supplied by Mr. W. H. Barnes, formerly Agricultural Field Officer, Negri Sembilan.

PRACTICAL SEED SELECTION OF COCONUTS.

BY

A. C. SMITH.

In the past the selection of seed for the planting of the main commercial areas of tall coconuts in Malaya appears to have been carried out on what, at the best, must be termed haphazard lines. This grants that, in most cases, planters have done their utmost with existing facilities to obtain the best planting material on offer.

In no branch of agriculture is good seed expensive, be times good or bad, and this is particularly the case with perennial crops with a long economic life — coconuts for example which normally remain profitable for a period of 30 to 60 years. In a crop of this nature planting is done once and for all, the use of poor material cannot be rectified in the following year as is the case with annual crops. The planter must stand upon the seed he provides in the first instance, therefore the expenditure of a few dollars more per acre on the best possible material is of little moment. Expressed in terms of cash one looks upon the difference between seed cost of $5 and $25 per acre on a 1000 acre estate as vast, but if by provision of improved seed, yields can be obtained only 10 per cent. above average, say from 10 to 11 piculs of copra per acre, the cost plus interest is fully recouped in 7 or 8 years—less than one quarter of the economic life of the palm—even with copra at $5 per picul.

Three methods of seed selection appear to have been used on the European owned coconut areas of Malaya.

(1). In the older (pre-1900) plantings, by purchase from any mature estates or kampongs which had some reputation for yields and which were so situated as to afford reasonably cheap transport.

(2). By mass collection from known high yielding estates or areas.

(3). In a few cases from selected heavy cropping palms in known high yielding areas.

Each method marks a definite step forward but it cannot be said that great progress has been made. It cannot be denied that in respect of this problem the coconut industry lags behind most other large scale tropical products. Rubber, a much newer commercial agricultural proposition, has made enormous strides during the past 10—12 years, whereas coconuts have practically nothing to record. The reason for this is undoubtedly the time involved in evolving and proving a pure strain—probably two generations or about 25 years. There is unfortunately, no short cut by vegetative propagation as in the case of rubber, but as coconuts have been established as a commercial proposition for upwards of thirty years in Malaya, the industry should by now be far ahead of where it actually is, and it must be admitted that very little energy has been applied to this most important yield factor.

Of the methods enumerated above, (2) is that most frequently used but at best it can only be expected to provide plants which will return good average yields. Examination of any high yielding area will establish the fact that the variation in yield per palm is from 0 to over 120 nuts per annum, with more than 50 per cent. of palms below average.

(3) is an improvement upon (2) but in most cases selection is confined to palms carrying heavy heads of nuts without due regard to copra content. Even where selection is carried a step further to handling and opening nuts from such palms for inspection of meat content, the margin of error is very large. Detailed examination of ripe nuts from 47 palms, all with a wet meat content of over 600 grammes, showed a variation in meat thickness between 10.5 and 15.5 mm. with the main group lying between 12.5 and 13.5 mm. Inspection of two nuts of approximately equal size with meat thickness of 12.5 and 13.5 mm. will indicate the difficulty of judging meat content by casual observation, yet the difference is no less than 8 per cent. An increase or decrease of 1 mm., although it has a very large bearing upon copra yield, is almost impossible to detect by eye alone.

Very detailed examination of palms and their nuts for seed purposes is, although laborious, well within the capabilities of any planter, and it requires no scientific training or special plant. From the writer's experience 600—700 palms can be examined and possibles marked in two to two and a half hours, and this is about as much as should be attempted at any one time; it is very tiring and one's power of observation flags towards the end. Where an area of palms returning yields well above average is available on an estate, the advantages of taking seed from such an area for extensions or replanting are manifest. The primary advantage is that environmental conditions are suitable, palms doing well on one part of an estate should do well elsewhere in the same area, assuming that there is no great difference in soil and drainage conditions. There is no guarantee that seed from high yielding palms on the free undulating soils of say Penang Island would do equally well on the flat alluvial clays of the Lower Perak District.

If seed is required for a small area, close selection is a simple matter, but, if a clearing no larger than 100 acres is to be planted, it will be necessary to scour a fairly wide area to obtain a sufficient quantity of the required standard. Seedlings are usually planted out fairly early in the rainy season, and to obtain sturdy plants of even growth at this time necessitates the laying down of seed for the whole area more or less simultaneously. There is undoubtedly a tendency towards economising in the number of seed nuts purchased or laid down, and in consequence one frequently notices that the last portion of a clearing contains a proportion of poor and weakly seedlings. The total seed laid down should not fall far short of 100 per cent. in excess of the number of plants required. For 100 acres planted 30 ft. x 30 ft. and, allowing for first supplying, 5000 plants are required: 9000 seed is none too many. With germination of 85 per cent.

which is rarely exceeded, the margin is only some 2500 plants, or in other words two in every three have to fulfil ideal conditions as regards growth. Using seed from palms yielding not less than 100 nuts per annum with a satisfactory copra content, not more than 35 suitable nuts will be obtained from each palm during the three heaviest cropping months. This necessitates not less than 250 selected parent palms, and as such palms, even in a very high yielding area, only amount to 3—5 per cent. of the whole stand, it entails the examination of 6000—7000 palms, or an area of 120—150 acres. If planting can be spread over a whole year it should be possible to obtain an average of about 150 nuts per acre from the selected area, or sufficient to plant up rather more than $1\frac{1}{2}$ acres per acre of the selected area.

No method of seed selection which has to contend with open pollination, and consequent hybridisation, can be described as ideal, but so far there is no available supply of seed coconuts of pure strain, at least not on the scale applicable to estate requirements when planting up large areas. Work of this nature is now being carried out by Officers of the Department of Agriculture at the Klang Experimental Station, but it will be long before a pure line is evolved and proved, two generations of coconuts or about 25 years, and then in all probability seed will not be available in large quantities. Beyond the fact that under normal conditions the tall coconut rarely if ever "selfs", and that therefore all seed must be cross pollinated, little is known of its genetics and hereditary traits. The best that can be done is to commence with an area containing a large percentage of palms yielding well above average, the chances of fertilisation from a high yielding parent being distinctly favourable. The methods adopted by the writer and described below should be the most satisfactory in the light of present knowledge and applicable on a commercial scale. Selection method (2) is fully complied with in that the area from which seed is taken returns yields far above average, and (3) is fulfilled by the close examination of individual palms, thus as far as possible ensuring good female stock.

Selected area. 80 acres.

Age. 27 years. Planted 1906.

Planting. 30 ft. x 30 ft. = 48 palms per acre.

Yields. Average 13 years 1920—1932, 3860 nuts per acre. Conversion approximately 235 nuts per picul copra = 16.3 piculs per acre. Actual stand of bearing palms 45.5 per acre = 82 nuts per palm.

Situation. All mature areas within approximately half mile radius return average yields of 3300—3500 nuts per acre.

Soil. Flat alluvial clay.

Total palms examined. 3875. Vacancies, supplies and non-bearers 153, bearing palms 3722.

Method of selection. Only palms carrying 100 nuts or more are selected as possible parents, all ripe nuts are collected from such palms and one typical specimen is selected for examination and weighing of wet meat.

Details of Palms.

Total examined	...	3875.	
„ 100 nuts and over	...	690 =	17.8 per cent.
„ 50 nuts and under	...	1109 =	28.6 „
Average of "100 nut" palms	...	117.23 nuts.	

Having thus arrived at exceptionally high yielding palms as regards number of nuts, the selected nut from each was then weighed for wet meat content. The following table gives the weight outturns in grammes wet meat per nut.

TABLE I.

Over 700 grammes	...	3 =	0.4 per cent.
600/700 „	...	47 =	6.8 „
500/600 „	...	191 =	27.7 „
400/500 „	...	307 =	44.5 „
300/400 „	...	128 =	18.6 „
Under 300 „	...	14 =	2.0 „
		690	100.0 per cent.

These figures necessarily refer only to the 690 selected palms. That there would have been nuts from the palms carrying under 100 nuts returning both larger and smaller wet meat yields cannot be doubted. They further emphasise that the proportion of really high grade palms in a very high yielding area is very small, and that mass seed collection from such areas is unsound. Only 241 palms of the 3875 examined returned 100 nuts of 500 grammes or more wet meat, equal to 6 per cent. In any system of close selection one would never go below 500 grammes.

The general yield of estate grade copra is 50 per cent.—53 per cent. of the wet meat content of nuts dealt with. Taking the lower figure, the approximate number of nuts required per picul of copra from the several categories is therefore :—

(453.59 grammes = 1 lb. 60479 grammes = 1 picul = 133.33 lbs.)

700 grammes	=	173 nuts per picul.
600 „	=	201 „ „ „
500 „	=	242 „ „ „
400 „	=	302 „ „ „
300 „	=	403 „ „ „

A small variation in size will be found in nuts from the same palm and even from the same bunch. One nut cannot therefore be taken as a definite determination but it is the best that can be done under normal estate conditions, and if care is taken in selection, is accurate within practical limits.

The selection of nuts on wet meat content merely denotes working to a standard, dependent almost entirely upon the area available for selection and the number of seed required. If a large clearing is to be planted up, it will probably be necessary to modify the standard; if a very small area, selection can be very close and high grade planting material can be secured. In the writer's case two small clearings totalling only 15 acres were planted with nothing under 575 gramme seed, but where nuts were supplied for a 50 acres clearing in one delivery the standard had to be scaled down to 500 grammes.

It is frequently asserted that nuts of pronounced ovoidal shape should not be used as seed. Details of shape of the whole 690 nuts were recorded and it was found that there was no practical difference in meat content between oval and round specimens. Neither did colour appear to have any bearing upon the value of the nut. Red, yellow and green types all show more or less the same percentage of good and poor yielders and high and low meat contents.

Further points emerged when approximately 500 nuts from 66 palms, all over 575 grammes, were laid down in the nursery. Wide variations in germination and growth were to be expected and careful notes were kept of the behaviour of seed from each palm. These were of such interest that a second batch was laid down as a check. In almost every case the general characteristics of seed from the same mother palm were identical in both batches. The first lot was laid down in July and notes taken in November, after four months. The second batch was laid down in November and notes taken in February, also after four months. Weather conditions in each case were favourable to germination and growth. The following examples of results from the two batches may be taken as typical of the whole.

Palm No. 12. 631 gr.	November 8 nuts.	Germination 8 = 100 per cent. All strong healthy plants.
	February 8 „	Germination 7 = 87 per cent. All strong even plants.
Palm No. 29. 588 gr.	November 10 nuts.	Germination 7 = 70 per cent. Weak and irregular, only 2 good.
	February 14 „	Germination 13 = 93 per cent. Very slow and weak, only 4 fair.
Palm No. 37. 575 gr.	November 10 nuts.	Germination 10 = 100 per cent. All strong even plants.
	February 25 „	Germination 24 = 96 per cent. All strong even plants.
Palm No. 51. 656 gr.	November 14 nuts.	Germination 9 = 65 per cent. No good plants, irregular and poor.
	February 9 „	Germination 1 = 11 per cent. Useless.
Palm No. 88. 585 gr.	November 10 nuts.	Germination 10 = 100 per cent. All poor plants with malformed shoots.

	February 8 „	Germination 5 = 62 per cent. Poor, all shoots malformed.
Palm No. 122. 575 gr.	November 7 nuts.	Germination 4 = 60 per cent. Weak, irregular and poor.
	February 10 „	Germination 6 = 60 per cent. Weak, irregular and poor.
Palm No. 160. 630 gr.	November 18 nuts.	Germination 9 = 50 per cent. All very poor plants.
	February 8 „	Germination 2 = 25 per cent. All very poor plants.
Palm No. 183. 588 gr.	November 12 nuts.	Germination 12 = 100 per cent. Exceptionally strong even plants.
	February 8 „	Germination 8 = 100 per cent. Very good and even.
Palm No. 190. 594 gr.	November 8 nuts.	Germination 4 = 50 per cent. Poor.
	February 4 „	Germination 1 = 25 per cent. Useless.
Palm No. 239. 605 gr.	November 2 nuts.	Germination 2 = 100 per cent. Both malformed shoots.
	February 12 „	Germination 10 = 83 per cent. 7 malformed shoots.

On the whole, the large nuts showed a small percentage of germination and less strong healthy plants than did those of more nearly average size. There was very little difference in total germination percentage between the two lots, and in each case almost exactly 60 per cent. good sturdy even plants were obtained after five and four and a half months respectively. This indicates that it is unsafe to lay down less than 80 per cent.—90 per cent. seed in excess of actual requirements.

The data recorded in the foregoing shows that there is room for vast improvement in yields by careful seed selection provided that the female parental characteristics are transmitted in the majority of cases. As stated previously, little in known regarding this at present but at the worst one commences with female stock of high standard, and with the male parent also taken from a high yielding area, chances are greatly in favour of better yields than have hitherto been attained. Returns of over 15 piculs of copra per acre are now deemed almost phenomenal, yet with promiscuous seed supply a large area is capable of yielding over 16 piculs per acre for 13 years. This is undoubtedly due largely to environmental conditions but it indicates that potentialities are greatly in excess of standards hitherto accepted as high, if close seed selection is carried out in an area of this yielding capacity. Even if environment is rather less favourable, selection on these lines should outweigh this, and similar yields, which are much above average, should be obtainable from any area of good coconut land with reasonable drainage facilities and good cultivation. Under approximately similar environmental conditions, with selection no closer than palms yielding 100 nuts per annum with a 550 grammes wet meat content, yields of over 20

piculs per acre should be attainable. (5000 nuts per acre at 220 nuts per picul.) Of the 3875 palms examined 123, or slightly over 3 per cent., reached this standard—1½ palms per acre. Any high yielding area,—3500 nuts per acre or better—should return approximately similar figures, therefore, as noted earlier, each acre should be capable of providing seed for about 1½ acres new planting each year. This by no means exhausts potentialities. Odd palms consistently returning over 800 grammes wet meat are met with. One in particular has so far averaged over 900 grammes and yields 70—80 nuts per annum or half a picul of copra from a relatively low nut output. The largest nut handled gave over 1100 grammes wet meat, which equals 100 nuts per picul.

Conclusions.

(1). By seed selection it should be possible to increase copra output per acre to a figure considerably in excess of that now accepted as normal.

(2). Examination of possible parent palms must cover both number of nuts and copra yield per nut. Also, having obtained seed of the required standard it is necessary to study nursery results in view of the fact that certain palms persistently yield nuts of low germination percentage and poor growth characteristics. Seed from high yielding palms is useless if it refuses to germinate, or having done so, produces progeny unfit to plant.

(3). Close selection of seed calls for nothing which cannot be carried out in ordinary estate practice, and is a simple matter on estates which contain areas of high yielding palms.

(4). With the standard scaled down to 100 nuts of 500 grammes palms, under 20 piculs per acre, only 6 per cent. of palms in a given area are fit for selection as mother palms.

(5). In the light of (4) mass seed collection from the best known areas can only be termed crude and haphazard.

Acknowledgment.

The writer is indebted to Dr. H. W. Jack, M.B.E., Economic Botanist, S.S. and F.M.S. for his lecture delivered at the Bagan Datoh Club on 2nd May 1929, subject "Improvement of the Coconut Crop by Selection". (*Malayan Agricultural Journal,* Vol. XVIII, No. 1.) Although no references are made to this paper, it furnished the incentive which led to the initiation and execution of the work described in this article, and the present conclusions confirm many of the statements made in that publication.

Miscellaneous Article.

OIL PALM FACTORY ON ULU REMIS ESTATE, JOHORE.

A further stage in the development of the oil palm industry in Malaya was reached on March 27th 1933 with the opening of the new oil palm factory on Ulu Remis Estate, Layang Layang, Johore, by H.H. the Sultan of Johore, who was accompanied by H.H. the Sultanah.

Ulu Remis Estate is owned by Oil Palms of Malaya Ltd., for whom Messrs Guthrie & Co., Ltd. are the Agents. The Estate comprises approximately 10,000 acres of oil palms, of which approximately 4,000 acres are now in bearing.

The press system has been adopted for the treatment of the fruit, the machinery being supplied by Messrs Gebr. Stork & Co., Amsterdam, Holland, for whom Messrs Guthrie & Co., Ltd. are the local Agents.

While it is not proposed to give a detailed description of the plant, reference will be made to certain special features, since there is no doubt that as regards both lay-out of factory and design of plant the whole installation constitutes a marked improvement on other press installations, by the same firm, already working in Malaya.

In order, however, to facilitate reference, it is proposed to give a brief description of the present factory process.

Description of Process.

Transport and Sterilisation of Bunches. The fruit bunches are harvested and transported in trucks on the light railway to the factory, where the trucks are weighed and the amount of bunches recorded.

The loaded cages pass into the steriliser, where the bunches are subjected to a maximum steam pressure of 40 lbs. per square inch for a period of approximately 50 minutes.

Sterilisation of bunches under this steam pressure has the effect both of arresting enzyme action in the fruit, which is responsible for the development of acidity in the oil, and of loosening the individual fruits in the bunch.

Excess steam pressure in the steriliser is followed by vacuum treatment with the object of reducing the moisture content. As regards the press system a reduction in moisture content of the pericarp is an advantage, since it ensures a more satisfactory recovery of oil owing to the smaller amount of cellular matter expressed with the oil. Vacuum treatment has the additional advantage that, with the general reduction in moisture content of the fruit, the kernels tend to shrink in the shells, thereby facilitating subsequent nut cracking, while it is also claimed that this treatment improves the colour of the flesh of the kernels. Under pressure sterilisation, kernels are apt to become slightly discoloured owing to the penetration of dark-coloured fruit juices, and even palm oil, and it is claimed that the subsequent vacuum treatment assists in the removal of such contaminants.

Separation of Fruit. The cages containing the treated fruit bunches are raised by means of electric hoists to the top of the building, where the threshing machines are installed. The empty cages are lowered to ground level and replaced on bogies ready for despatch to the field.

The fruit bunches pass through the threshing machines, which separate the fruit from the bunch stalks. The fruit passes to an automatic weighing machine prior to being digested, and the bunch residue is collected in trucks. This residue may be dried and used as fuel for the boilers or taken back to the field for returning to the soil.

Treatment of Fruit. The fruit is then digested, the mash being delivered to the presses for recovery of oil. The digesters and the presses are of much greater capacity than Stork presses installed on other estates. Reference will be made later to the improvement in design.

Purification of Oil. The crude oil is taken to the purification plant, where it is first treated with live steam, and the mixture of oil and water allowed to settle. After sedimentation the washed oil is passed through a filter press before being pumped to the large storage tank, from where the oil is delivered to railway tank wagons for despatch to the bulk installation plant at Singapore.

If it is necessary to reduce the impurities still further the oil from the filter press can be subjected to a vacuum drying treatment, which, with a further filtration, would result in the preparation of an oil free from moisture and dirt.

The sludge from the washing tanks is treated for the recovery of a further quantity of oil before it is allowed to run to waste.

Separation of Nuts and Fibrous Residue. The press residue is broken in a crusher and treated in a special form of multiple drum drier, through which hot air circulates. The separation of the pericarp residue from the nuts is effected finally by means of a blast of air. Since there is no secondary recovery of oil, the fibrous residue is discharged direct to the boilers.

Treatment of Nuts. The clean nuts from the depericarper are graded according to size and passed to the nut cracking machines. The separation of the fragments of shell and the kernels is effected by means of a suspension of clay in water, in which the kernels float, while the fragments of shell sink. Automatic arrangements are available for washing both the kernels and fragments of shells with water in order to free them from adhering clay. The kernels are dried before bagging, while the fragments of shell are used as fuel for the boilers.

Remarks.

As regards the lay-out, the principal feature is the generous scale on which the factory has been designed, ample space having been provided for the installation of additional machinery at any particular stage of the process. Such foresight is most commendable, since it ensures that dislocation of work in a factory is reduced to a minimum when further machinery must be installed in order to deal with increased crops of fruit.

As mentioned previously, the capacity of the press has been increased considerably, those installed having a capacity of approximately 4 times as much as the press installed at the Government Experimental Plantation, Serdang. This increase will result in an increased rate of working without the necessity of additional labour.

The writer was much struck with the design of the new presses, especially with the absence of exudation of oil from the top of the press when working.

A further noticeable feature of the plant is the provision of weighing machines at various stages for recording the weights of different products, thereby facilitating the introduction of a system of factory control by which the optimum conditions of working may be determined and the maximum recovery of products obtained.

Compared with similar installations there is no doubt that the plant on Ulu Remis Estate constitutes a marked improvement in every way, and all those concerned are to be congratulated in providing the Estate with a factory which, as far as press installations are concerned, may be described as second to none.

C. D. V. G.

Abstract.

THIRTEENTH REPORT ON NATIVE RUBBER CULTIVATION.

Fourth Quarter 1932.

Prepared by the Bureau of Agricultural Economics of the Division of Agriculture of the Netherland Indian Department of Agriculture, Industry and Commerce, at Buitenzorg, Java, March 10th, 1933.

The report states that the rubber prices at Batavia were stabilised to a large degree during the fourth quarter of 1932 owing mainly to the fact that Japan was regularly in the market. Throughout the year, export of native rubber was influenced to a marked degree by the trend in prices, the lowest exports coinciding with the fall in prices during April, May and June. In 1932 the total exports in metric tons (dry equivalent) amounted to 62,381 as compared with 88,717 in 1931 and 90,496 in 1930.

While the drop in 1932 exports amounted to 30 per cent. of those in 1931, in consideration of the fact that the potential production is steadily increasing (250 thousand tons in 1932 as compared with 200 thousand tons in 1931) it will be seen that a very considerable voluntary and natural restriction took place, the actual production only amounting to 25 per cent. of the potential production in 1932.

In most of the producing districts, native rubber cultivation has declined in importance in favour of the cultivation of food crops, the former being regarded only as a means of raising money for necessary purposes when required, tapping activities being, in consequence, conducted in a very irregular manner.

There has also been a marked decline in the activity of plants which prepare rubber for export, the export of machine-worked rubber dropped to 43 per cent. of the quantity exported in 1931.

The following are among the interesting points abstracted from reports from the various producing areas :—

Acheen and Dependencies. An increase in production in the fourth quarter as compared with the third is to be explained by the favourable trend in prices and also by the fact that labour was not absorbed by rice cultivation. In spite of the important drop in prices during the middle of December tapping was continued and stocks increased. It was observed that family labour was used more than formerly, hired labour being only employed sporadically on some of the larger holdings.

Taparoeli. Exports of native rubber, which were low in October, rose in November but dropped again in December. Tapping was almost entirely stopped and Javanese labour which had been employed during the period of enhanced prices was obliged to leave this area and go to other parts of Sumatra.

Sumatra West Coast. On account of the slight improvement in prices during the fourth quarter tapping was renewed, the majority of the rubber being prepared in the form of wet slabs. Work was done mainly by family labour but wherever outside assistance was needed such labourers received two-thirds of the rubber produced.

Djambi. Rubber was sold direct by the producers to the buyers who carried on a barter traffic with the natives. Only in areas where insufficient production of food crop occurs may it be said that rubber is still the leading industry. The number of hired labourers declined steadily.

A small amount of rubber was cut down for the planting of food crops.

Palembang. It is estimated that during the fourth quarter less than 10 per cent. of the tappable area in the province was being tapped, tapping only being carried out when the need for cash was greatest.

Western Division of Borneo. This region exported more rubber during the fourth than in previous quarters. This is accountable for by the fact that the period October—December is the lean time between harvests of food crops, and that money was required for the cleaning up of neglected holdings and for the approach of the native and Chinese holidays.

Southern and Eastern Division of Borneo. Work in connection with the cultivation of padi and other food crops and the decline in prices in December caused a considerable decrease in rubber production towards the end of the quarter.

Generally the tapping or non-tapping of holdings is connected with the necessity of obtaining money for payments which cannot be made in kind, although wherever small-holders own none but rubber land, tapping is of necessity carired out, since alternative work is not available.

AGRICULTURAL MARKETING BILL, 1933.*

A new Bill dealing with the marketing of agricultural products was introduced in the House of Commons on March 6. Major Elliot moved the Second Reading on March 13 and the debate on this stage of the Bill was concluded on March 20.

As its title suggests, the Bill is a development from the Agricultural Marketing Act, 1931. It is divided into four parts, the main provisions of which are briefly explained below.

Part I deals with the regulation of supply which, in some cases, is necessary to secure the effective reorganization of marketing and the stabilization of markets. Regulation of supply involves regulation of the two tributaries of the market-stream, namely, imports and supplies from home sources. Clause 1 accordingly empowers the Board of Trade to regulate the importation of a product if it appears that such action is necessary in order to enable the reorganization of a branch of the agricultural industry by a scheme under the Act of 1931 to be fully effective; and Clause 2 empowers the Ministers responsible for agriculture in the United Kingdom to regulate the home output of any product which is the subject of an important Order under Clause 1.

These Clauses enable effect to be given to recommendations of the Reorganization Commission for Pigs and Pig Products†. The possibility of proceeding by voluntary agreement rather than by compulsory Order is not precluded. Provision is also made in this part of the Bill for the appointment of a Market Supply Committee whose chief function will be to make a continual and expert study of supply problems, which the policy of supply regulation must solve, and to advise the Ministers in the exercise of their function in that connexion.

Part II also gives effect to the recommendations of the Reorganization Commission for Pigs and Pig Products. It provides for the joint exercise of power by producers of a secondary product (*e.g.*, bacon) and of a primary agricultural product (*e.g.*, pigs), being the raw material of the former product, and for the organization by these producers of the production of the secondary product. The method by which producers can acquire these powers follows the democratic precedent set by the 1931 Act, that is to say, they are enabled to submit a scheme constituting a development board equipped with such powers, within the scope of Clause 6 of the Bill, as the scheme may provide.

Part III, and the Third Schedule contain a number of amendments to the 1931 Act, the desirability of which had been suggested by the experience of the Reorganization Commissions for Milk and for Pig Products and of the Hops Marketing Board; and Part IV contains a number of miscellaneous and supplementary provisions, one of which, limiting validity of contract in the sale of eggs to transactions conducted on the basis of weight or statutory grade, is designed to meet, in some degree, the generally-expressed desire for further legislation to encourage the standardization of egg-grading.

* Abstracted from the Journal of the Ministry of Agriculture, Vol. XL, No. 1, April 1933.

† Report of the Reorganisation Commission for Pigs and Pig Products: Economic Series No. 37.

MALAYA AT THE BRITISH INDUSTRIES FAIR 1933.*

The British Industries Fair (February 20th to March 3rd 1933) was again held simultaneously at Olympia (general exhibits), the White City (textiles and furniture) and Birmingham (machinery). The Empire Marketing Board Section was, as in previous years, situated at Olympia, and the Malaya stand occupied the same corner site as in 1932.

A new style of stand-construction was adopted this year by the Empire Marketing Board, the main feature of which was that the display-counters were fronted with chromium plate. Aided by this very effective novelty, it was an easy matter to make the Malayan stand attractive by the usual array of coloured cut-outs, maps, posters and weapons, while the stuffed tiger, backed by a gong, hung from a pair of elephant tusks, formed an arresting centre-piece.

The front counters were devoted to the display of the chief exhibits *viz.*, tinned pineapple, rubber firelighters, the industrial applications of "Revertex", and palm oil.

There was a very pleasing volume of inquiry for Malayan pineapple from continental buyers, particularly from those representing Scandinavian firms.

Four varieties of rubber firelighters were exhibited, *viz.*, (*a*) ordinary plantation crepe made up in bundles, (*b*) and (*c*) two sorts of lighter composed of rubber, coconut fibre and wax, and (*d*) the "Rubylite", composed of rubber, sawdust and paraffin.

Demonstrations with all these types of firelighter were given. The qualities of "Rubylite", which seemed to make the most telling appeal, were cleanliness, economy and absence of odour. The substance is made up in small cakes retailed at 6d. per 1 lb. packet, the quantity in such a packet being sufficient, it is claimed, to kindle between 30 and 40 fires, which works out cheaper than firewood.

Enquiries for these firelighters were received from Canada, Belgium, Ireland, Norway and Germany.

The "Revertex" exhibits were varied in nature and included, amongst others, the following:—"Plasoleum" process as applied to roadways, tennis-courts and cricket-pitches; glass tiles fixed to bathroom walls with coloured "Revertex"; rubber flooring; rubber boot-lace tags; machine beltings; splash-proof materials for covering walls; cushion-stuffings of "Revertex" combined with pigs' hair; sponges; carpet-fabrics; shoe-insoles; tank-linings; beach shoes and Wellingtons; hessians for baling perishable goods; toys; perambulator-coverings; soles and heels; surgical gloves; non-slip bath mats.

It need scarcely be said that the "Plasoleum" roadway was the most important among these varied exhibits and it attracted a degree of attention beyond the most optimistic expectations. For this favourable notice, the two chief reasons were (*a*) that roads treated with "Plasoleum" are claimed to have been definitely proved to be skid-proof and (*b*) that the price is reasonable. It is

* Abstract of Report by Mr. H. S. Banner, Publicity Officer, Malayan Information Agency.

at present approximately £1 per square yard laid, and is likely to become cheaper still in the near future.

The exhibit was directly instrumental in introducing the process to a large number of City and Borough engineers. Many interesting suggestions for applications of the process were received at the stand, some of which might well lead to new developments on a large scale. One such proposal which deserves a mention was for "Plasoleum" floors in cow-houses, to preserve the cows from the chills which are so often imparted by bare concrete.

It should be added that the decision to make a specially prominent feature of "Revertex" exhibits was due to the fact that this process appears to be one of the more promising roads to the adoption of "new uses" for rubber on a really big scale.

With regard to palm oil an opinion was expressed that palm oil produced in Africa is likely to remain a low grade product, fit only for the soap making industry, leaving the edible fat manufacturing market open for higher grade oils, and that painstaking research should enable Malaya to produce an oil, from the oil palm, capable of competing very favourably with the best coconut oil for the edible fat market.

The stand was visited by Her Majesty the Queen, the Princess Royal, the Duke and Duchess of York, Prince George, the Prime Minister, Sir Philip Cunliffe-Lister, the Lord Mayor, and many other distinguished personages, all of whom expressed a keen interest in the display.

From the point of view of genuine business enquiry, it is felt that this year's British Industries Fair was beyond question the most successful in which Malaya has participated, and it is particularly gratifying to feel that some material benefit may accrue, as the result, to the rubber industry.

Departmental.

FROM THE DISTRICTS.

The Weather.

The fairly heavy rainfall of April continued for the first half of May in Kedah, Province Wellesley and North Perak but the remainder of the month was considerably drier. As compared with the average for the month total precipitation approximated to normal for Kedah and was normal or below average for Province Wellesley and North Krian. From there southwards, however, the rainfall was well above average throughout South Perak, Selangor, Negri Sembilan and West Pahang and heavy rain persisted throughout the month in the three last named areas, so that in many parts the total greatly exceeded the average for May.

In parts of Johore also the rainfall was well above average but approximated to normal in Malacca, Singapore and East Pahang whilst the very dry weather of Kelantan continued.

Remarks on Crops.

Rubber. The highest and lowest prices in dollars and cents per pikul, recorded during the month in returns from a large number of centres throughout the country, were—Smoked Sheet $8 to $12.25; Unsmoked Sheet $7 to $11.25; Scrap $1.80 to $5.50. The average Singapore price recorded for small-holders' rubber is—Smoked Sheet $11.80; Unsmoked Sheet $11 and Scrap $5 whilst Penang prices for Unsmoked Sheet ranged from $7 to $10.30.

It is reported from most parts of the country that this substantial increase in price has resulted in many more holdings being brought into tapping. In many areas, however, the frequency of wet mornings has reduced the opportunities for tapping so that in such areas no marked increase in production is likely to have yet taken place. Reports indicate that there has been a general tendency throughout the country for small-holders to clear up heavy undergrowth from holdings, suggesting an enlivened interest in the crop.

The position regarding Mouldy Rot disease remains similar to that reported last month, namely, although wet weather has induced increased activity of the disease on tapped holdings, sufficient attention to control is generally given to prevent heavy damage to bark.

Padi. The price of padi at the Government Rice Mill at Bagan Serai has been maintained at the figure of $1.60 a pikul given last month. In Kedah the price has risen slightly being from $9—$9.50 a kuncha (160 gantangs) as compared with last month's figures of $8—$8.50. The present price is approximately equivalent to from 5½ to 6 cents a gantang as compared with 6½ cents as equivalent for the Bagan Serai quotation.

Last season's crop in Kedah is now estimated to have totalled 75½ million gantangs, higher than any crop yet recorded.

In Malacca there has been a heavy demand from cultivators for the purchase of specially high yielding pure strain seed for next season's sowing. Some 4,000 gantangs have been sold and all available seed of the best three strains has been disposed of.

Coconuts and Copra. Further satisfactory reports are to hand regarding the improvement of Copra production in Province Wellesley. Consignments from two of the recently erected approved pattern kilns received the prices ruling on the Penang market for best quality copra, and consignments are now being sent regularly to Penang from several of such kilns.

Some further progress is reported in the erection of the approved types of kilns in Bagan Datoh but the low price that has prevailed for copra has tended to retard matters in some instances.

In Selangor, a slight improvement is reported in relation to the kiln in the Klang district.

In Johore, arrangements have been completed for the sale of well prepared small-holders' copra to a firm in Singapore.

Coffee. For some time past attention has been given to encouraging Malay small-holders, in the Kuala Langat district of Selangor, to prepare their own coffee and assistance has been given them to find suitable markets. It is reported that much of the coffee so prepared commands a premium over the coffee prepared by Chinese in the district.

Agricultural Stations.

During the month the Director and the Chief Field Officer visited several of the Agricultural Stations and the following notes are made in the light of these visits and are not only based on the monthly reports.

Now that the planting programme on Bukit Mertajam Station, Province Wellesley, is well advanced, the advantage of the care given to the lay-out of the station is emphasised. A pleasing feature is the well kept grass paths that give easy access to all the plots and which were planted with carpet grass as part of the preliminary establishment work. The present appearance of all the crops planted is very satisfactory. On the area as yet unplanted a very satisfactory stand of cover crops has been established with the help of a light dressing of basic slag at the time of sowing, and the good appearance of the crop is maintained by selective hand weeding.

The Sungei Udang Station, in Malacca, is the most advanced of any of the Stations and is now in a fair way towards providing an example of what was envisaged when plans for the establishment of these Stations were formulated. This Station includes a small area of padi land which is at present being cultivated preparatory to planting next season's crop.

Cheras Station, in Selangor, includes poultry demonstrations, market gardening for the purpose of studying Chinese methods and pig rearing. The Station was well laid out, and is at present maintained in a fairly satisfactory manner, though in wet weather some difficulty is experienced in keeping the Station free of weeds on the sum allotted for its upkeep for the year.

Further progress has been made during the month on the lay-out of the Rembau Station in Negri Sembilan.

The Pineapple Station in Singapore is now providing preliminary results from many of the experiments on manuring and cultivation that were laid down. Apart from the main crop, some good results are being obtained from propagating desirable varieties of Rambutan by the etiolation method which has been employed successfully in England in raising fruit stocks true to type.

Padi Stations & Test Plots.

The coming season's programme for Titi Serong has been laid down, and, on most Stations and Test Plots, areas have been demarcated for next season's experiments and demonstrations.

DEPARTMENTAL NOTES.

Visits and Tours.

The Director of Agriculture, Dr. H. A. Tempany, C.B.E., visited Cameron Highlands from May 18th to May 20th and inspected the Experiment Station at Tanah Rata.

The Director also visited Krian and Kuala Kangsar and Province Wellesley from the 25th—27th May and inspected the Experiment Stations and other agricultural undertakings at these places.

The acting Chief Field Officer, Mr. F. Birkinshaw, who accompanied the Director on the tours mentioned above, visited Singapore on May 30th.

Mr. J. H. Dennett, Assistant Chemist, visited a number of the Stations and padi areas in Perak during the month of April in connection with padi soil investigations.

Mr. J. N. Milsum, Senior Assistant Agriculturist, visited Sumatra from May 4th—May 19th with the object of studying conditions and progress in relation to the oil palm industry in that country.

School of Agriculture, Malaya.

The School year closed on 13th April and the first term of the present School year commenced on May 15th. It has been decided to introduce practical instruction on poultry husbandry, into the curriculum, during the coming School year. Operations will be on a modest scale only, until experience has been gained. A site has been prepared, and the necessary pens and sheds are in course of erection.

The F.M.S. Government has decided to award six major and six minor Scholarships for the School this year. Regulations have been sent to all Schools concerned, and numerous applications have been received, particularly for the minor Scholarship.

A party of pupils from the High School, Kajang, visited the School during April.

The Rural Lecture Caravan.

An extensive tour of the Ulu Langat, Kuala Langat, Klang, Kuala Selangor and Sabak Bernam Districts was made by the Caravan during the latter part of February and the first week of March 1933. The subjects for the afternoon lectures depended on the locality, and referred principally to food crops, coffee cultivation and preparation, copra and padi.

The Caravan made a three week's tour in Malacca from March 17th to April 5th and visited seventeen centres. At most centres the people who attended the afternoon lectures showed keen interest and numerous questions were asked.

Staff changes and leave

Mr. H. T. Pagden, formerly Assistant Entomologist, Department of Agriculture, S.S. and F.M.S., has been seconded for service in the British Solomon Islands to investigate certain problems connected with the coconut industry in these Islands.

On his way to take up his new appointment, Mr. Pagden disembarked at Penang and spent some days in Perak and Kuala Lumpur prior to sailing from Singapore on May 20th.

Mr. H. J. Simpson, Agricultural Field Officer, Selangor, has been granted 21 days convalescent leave and 22 days casual leave. Mr. Simpson departed on a sea trip, to Japan and back, on April 29th.

Statistical.

MARKET PRICES

May 1933.

Rubber.—The market price for rubber has risen steadily during the month, opening at 8 3/16 cents per lb. for spot loose in Singapore and closing at 10⅝ cents. The latter is the highest prices reached since December 30th., 1931. The average price for the month was 9.08 cents per lb. in Singapore, 2.87 pence in London and 4.8 cents, gold, in New York, as compared with 6.92 cents, 2.34d. and 3.47 cents gold respectively in April.

Palm Oil.—The course of the English market during May, on a basis of 18 per cent. f.f.a., c.i.f. Liverpool, was as follows:—4th. £16 per ton; 11th. £16.10.0; 18th. £18; 25th. £19.

Prices in the U.S.A., landed weight per pound in bulk c.i.f. New York/Philadelphia, were 2.85 cents, gold, on 3rd., 3.00 cents on 10th. and 17th., and 3.05 cents on 24th.

The price of palm kernels Fair Average Malayan Quality c.i.f. landed weight on the Continent rose from 18s. 9d. per cwt. on 3rd. to 21s. 6d. on 24th.

Copra.—The market improved towards the end of the month. The highest Singapore price for sundried during May was $4.35 per picul (29th.—31st.), the average price being $3.96 per picul as compared with $3.82 during April. The mixed quality averaged $3.70 per picul as compared with $3.56 in April.

Coffee.—Prices at Singapore for Sourabaya coffee declined during the month, ranging, according to grade, from $20 to $22.50 as compared with $22.50 to $26 during April.

Palembang coffee dropped from $18.50 to $16.50 averaging $16.87 as compared with $18.87 in April.

Arecanuts.—Palembangs averaged $2.61 and Bila Whole averaged $2.86 per picul, as compared with $2.32 and $2.33 respectively during April. The range of Singapore prices for other grades were:—Split 3.50 to $5; Red Whole $3.50 to $5; Sliced $5 to $8.50; Kelantan $3.25 to $4.80.

Rice.—The following are the average wholesale prices per picul of rice in Singapore during April:—Siam No. 2 $3.69, Rangoon No. 1 $3.40, as compared with $3.40 and $3.05 per picul during March. The average retail market prices in cents per gantang of No. 2 Siam rice in April were:—Singapore 26, Penang 28, Malacca 27, as compared with 26, 28 and 27 cents respectively in March.

Gambier.—Block Gambier declined slightly, the average price being $3.94 per picul, Cube averaged $7.50 per picul. Corresponding prices for April were $4.44 and $8 per picul respectively.

Pineapples.—Though the turnover has not been large, values are firmer and Packers are inclined to hold in anticipation of better prices: the average

Singapore prices per case in May were :—Cubes $2.85, Sliced Flat $2.75, Sliced Tall $2.99, as compared with $2.99, $2.89 and $3.11 respectively during April.

Tapioca.—The price of Flake averaged $4.36 as compared with $4.17 in April. Pearl Seed averaged $5.06 as compared with $4.93 in April and Pearl medium averaged $5.31 as compared with $5.12 in the previous month.

Sago.—Pearl small fair remained steady at $4.40 as compared with $4.42. Flour Sarawak Fair averaged $1.85 as compared with $1.79 in April.

Mace.—Average prices, more or less nominal, were $60.50 per picul for Siouw and $38 for Amboina.

Nutmegs.—There has been small demand during the month. The average Singapore price per picul for 110's was $18.12 as compared with $19.50 in April. 80's remaining steady at $24.25 as in the previous month.

Pepper.—Average Singapore prices during May were as follows :—Singapore Black $15.25 per picul, Singapore White $24.87 and Muntok White $25.62, the corresponding prices for April being $13.63, $20.94 and 21.50 respectively.

Cloves.—There has been no demand for cloves, nominal prices being quoted at $40 for Zanzibar and $45 per picul for Amboina.

The above prices are based on London and Singapore daily quotations for rubber; the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil quotations are kindly supplied by Messrs. Cumberbatch & Co., Ltd. and Messrs. Guthrie & Co., Ltd., Kuala Lumpur, and the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at 2s. 4d.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural products. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W. 1.

GENERAL RICE SUMMARY.

April, 1933.

Malaya.—Gross foreign imports of rice (including stocks available for re-export) during April 1933, amounted to 43,579 tons, (as compared with 38,275 tons in April 1932) of which 50 per cent. were consigned to Singapore, 21 per cent. to Penang, 6 per cent. to Malacca, 20 per cent. to the Federated Malay States and 3 per cent. to the Unfederated Malay States.

Of these imports, 50 per cent. were from Siam, 46 per cent. from Burma, 3 per cent. from Indo-China and 1 per cent. from other countries.

Total foreign exports of rice from Malaya in April 1933, were 11,344 tons (including 263 tons local production) as compared with 12,821 tons in April 1932.

Of these exports 80 per cent. were consigned to Netherlands India and 20 per cent. to other countries.

Net imports for the period January to April 1933, were 130,683 tons as compared with 139,539 tons during the same period for 1932, a fall of 6 per cent.

India and Burma.—Total foreign exports of rice during March 1933, were 277,000 tons as compared with 174,000 tons in the previous month and 357,000 tons in March 1932.

Total exports of rice and bran from Burma during the period January 1st to April 1st 1933, amounted to 890,692 tons as compared with 1,087,596 tons for the corresponding in 1932, a decrease of 18.1 per cent.

Siam.—Exports (approximate) during April 1933, amounted to 135,112 tons as compared with 113,555 tons in April 1932.

Netherlands India, Java and Madura.—At the end of March 1933, the area harvested amounted to 1,179,000 acres a decrease of 112,000 acres or 9 per cent. as compared with the corresponding period of 1932: the area damaged was 30,000 acres a decrease of 7,000 acres or 19 per cent. as compared with 1932, and additional plantings awaiting harvesting amounted to 6,993,000 acres an increase of 217,000 acres or 3 per cent.

French Indo-China.—Entries of padi at the port of Cholon from January to April 1933 amounted to 441,000 (metric) tons, an increase of 137,000 tons or 45 per cent. as compared with the same period of 1932.

Exports of rice from Saigon for the period January to April 1933 totalled 502,000 tons, an increase of 92,000 tons or 22 per cent. as compared with the corresponding period of 1932.

Ceylon.—Imports for the period January to March 1933 totalled 112,920 tons, a decrease of 18,989 tons on the imports for the same period of 1932.

Of these imports 19 per cent. were from British India, 74 per cent. from Burma, and 7 per cent. from other countries.

Europe and America.—Quantities of rice shipped from the East were :—

(*a*) To Europe for the period January 1st to April 20th, 458,268 tons, a rise of 136,269 tons or 42 per cent. as compared with the same period of 1932. Of these shipments 44 per cent. were from Burma, 5 per cent. from Japan, 42 per cent. from Saigon, 8 per cent. from Siam and 1 per cent. from Bengal, as compared with 62 per cent. from Burma, nil from Japan, 31 per cent. from Saigon, 2 per cent. from Siam and 5 per cent. from Bengal in 1932.

(*b*) To the Levant, period January 1st to March 22nd, 9,457 tons, a fall of 13,104 tons or 58 per cent. as compared with the same period of 1932.

(*c*) To American and the West Indies for the period January 1st to March 31st 1933, 27,684 tons, a decrease of 16,226 tons or 37 per cent. as compared with the same period of 1932.

MALAYA RUBBER STATISTICS

ACREAGES OF TAPPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING April, 1933.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1932	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING		Total (3) + (5)	Percentage of (7) to (2)
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
STRAITS SETTLEMENTS :—							
Province Wellesley	44,734	2,350	5.3	8,368	18.7	10,727	24.0
Dindings	6,969	404	5.8	920	13.2	1,324	19.0
Malacca	111,780	5,840	5.2	21,954	19.6	27,794	24.9
Penang Island	1,635	1,259	77.0	55	3.4	1,314	80.4
Singapore Island	28,269	14,038	49.7	3,659	12.9	17,697	62.6
Total S.S.	193,387	23,900	12.3	34,956	18.1	58,856	30.4
FEDERATED MALAY STATES :—							
Perak	250,951	15,475	6.2	32,745	13.0	48,220	19.2
Selangor	308,379	21,050	6.8	41,110	13.3	62,160	20.1
Negri Sembilan	228,541	17,928	7.8	20,250	8.9	38,178	16.7
Pahang	38,141	9,028	23.7	4,790	12.5	13,818	36.2
Total F.M.S. ...	826,012	63,481	7.7	98,895	12.0	162,376	19.7
UNFEDERATED MALAY STATES :—							
Johore	325,747	45,081	13.8	31,340	9.6	76,421	23.5
Kedah (*a*)	114,551	8,909	7.8	6,985	6.1	15,894	13.9
Kelantan	21,175	9,774	46.2	1,377	6.5	11,151	52.7
Trengganu (*b*)	4,352	Nil	Nil	2,072	47.6	2,072	47.6
Perlis (*a*)	957	106	11.1	502	52.5	608	63.5
Total U.M.S. ...	466,782	63,870	13.7	42,276	9.0	106,146	22.7
TOTAL MALAYA ...	1,486,181	151,251	10.2	176,127	11.8	327,378	22.0

Notes :— (*a*) Registered companies only and are rendered quarterly.

(*b*) Registered companies only.

The above table together with a Summary, was prepared and published by the Statistics Department, S.S. and F.M.S. in May 1933.

MALAYAN AGRICULTURAL EXPORTS, APRIL, 1933.

PRODUCT.	Net Export in Tons.				
	Year 1932	Jan.-April 1932	Jan.-April 1933	April 1932	April 1933
Arecanuts ...	20,280	9,098	7,949	1,990	2,443
Coconuts, fresh ...	108,123†	33,168†	30,652†	10,191†	9,043†
Coconut oil ...	11,932	3,499	6,312	857	1,676
Copra ...	97,464	24,026	29,160	5,383	8,258
Gambier, all kinds ...	2,925	1,016	749	187	156
Palm kernels ...	1,248	300	418	35	65
Palm oil ...	7,892	1,929	2,301	485	1,199
Pineapples, canned ...	66,291	22,543	17,635	6,169	4,700
Rubber ...	417,137	137,237	136,056	32,161	36,752
Sago,—flour ...	10,267	4,453	1,529	691	48
„ —pearl ...	3,128	853	665	211	160
„ —raw ...	4,148*	1,273*	1,373*	224*	295*
Tapioca,—flake ...	9,028	3,092	4,135	914	1,080
„ —flour ...	392	108*	64	13*	28
„ —pearl ...	19,977	6,585	5,600	1,913	2,135
Tuba root ...	165½	41½	126	11½	46

† hundred in number. * net imports.

ACREAGES OF TAPPABLE RUBBER OUT OF TAPPING IN NETHERLANDS INDIA AT END JANUARY, 1933.

	A Totally Ceased.		B Partly Ceased.		Total A & B	
	Estates	Area in acres	Estates	Area in acres	Estates	Area in acres
Java and Madura ...	135	56,000	67	18,135	202	74,135
Outer Provinces ...	204	74,537	69	41,360	273	115,897
Netherlands India ...	339	130,537	136	59,495	475	190,032

The total area out of tapping for January amounts to 19 per cent. of the total tappable area at end of December, 1932.

(Authority: Economisch Weekblad dated 17th March, 1933).

MALAYA RUBBER STATISTICS — TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF APRIL, 1933 IN DRY TONS.

Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month		
								during the month		January to April 1933		during the month		January to April 1933				
	Ports	Dealers	Estates of 100 acres and over	during the month	January to April 1933	during the month	January to April 1933	Foreign	From Malay States Labuan	Foreign	From Malay States Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
MALAY STATES :—																		
Federated Malay States	...	11,855	10,969	9,652	42,033	7,271	29,124	Nil	Nil	Nil	Nil	11,861	5,437	53,040	23,585	...	12,036	10,394
Johore	...	2,544	3,238	3,411	13,496	4,159	16,041	Nil	4	Nil	11	1,047	6,378	3,956	25,663	...	2,688	3,243
Kedah	...	444	1,821	2 030	8,545	1,126	4,401	Nil	Nil	Nil	Nil	955	2,042	4,531	9,257	...	455	1,969
Perlis	...	24	12	7	31	2	22	Nil	Nil	Nil	Nil	Nil	8	Nil	68	...	25	12
Kelantan ...	...	145	144	145	549	527	1,366	Nil	Nil	Nil	Nil	100	507	290	1,552	...	199	155
Trengganu ...	...	55	50	123	385	62	192	Nil	Nil	Nil	Nil	Nil	185	Nil	577	...	55	50
Total Malay States	...	15,067	16,234	15,368	65,039	13,147	51,153	Nil	4	Nil	11	13,963	14,557	61,817	60,702	...	15,458	15,823
STRAITS SETTLEMENTS :-																		
Malacca ...	...	5,910	1,581	1,202	4,974			Nil		9		4,692		17,502		...	4,349	1,396
Province Wellesley	...	828	447	419	1,824			Nil		Nil						...	893	474
Dindings ...	...	30	107	82	366	1,749	7,488	Nil	14,581	Nil	60,815	4,573	Nil	25,515	Nil	...	35	95
Penang	842	4,524	8	2	6			328		1,805						517	4,419	6
Singapore ...	2,392	19,563	141	129	552			5,703		21,415		13,524		58,147		2,797	20,510	139
Total Straits Settlements	3,234	30,855	2,084	1,834	7,722	1,749	7,488	6,031	14,581	23,229	60,815	22,789	Nil	101,157	Nil	3,314	30,206	2,110
TOTAL MALAYA	3,234	45,922	18,318	17,202	72,761	14,896	58,641	6,013	14,585	23,229	60,826	36,752	14,557	162,974	60,702	3,314	45,664	17,933

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Total
20	21	22	23	24	25	26
DRY RUBBER	8,960	18,585	3,946	5,139	1,008	127
WET RUBBER	3,076	1,925	473	138	1,680	328
TOTAL ...	12,036	20,510	4,419	5,277	2,688	455

TABLE III
FOREIGN EXPORTS

PORTS	For month	January to April inc. 1933
Singapore ...	20,765	92,664
Penang ...	7,911	39,929
Port Swettenham.	5,753	24,643
Malacca ...	2,323	5,738
MALAYA ...	36,752	162,974

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	January to April inc. 1933
Malay States ... / Straits Settlements	30,630	138,864
MALAYA ...	30,630	138,864

Notes :—1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [19A] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements, Columns [7] and [8] represent purchases by dealers from local estates of less than 100 acres, reduced by 15% to terms of dry rubber.

3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15%; wet sheet, 25%; scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.

4. Domestic exports are estimated by deducting the average monthly dry weight of foreign imports over a period of 2 months from the gross foreign exports of the later month, the foreign exports of the Malay States being domestic production.

5 The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 23rd of May 1933.

METEOROLOGICAL SUMMARY, MALAYA, APRIL, 1933.

Locality	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of			Absolute Extremes						Total		Most in a day	Number of days					Total	Daily Mean	Per cent
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation .05 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						hr.	hr.	%
Railway Hill, Kuala Lumpur, Selangor ...	90.1	72.6	81.3	94	70	81	75	84.5	85.1	11.38	289.1	2.03	20	19	8	7		161.00	5.37	44
Bukit Jeram, Selangor ...	87.2	73.0	80.1	90	70	81	75	84.1	86.2	6.63	168.4	2.17	16	14	4			175.70	5.86	48
Sitiawan, Perak ...	89.7	73.4	81.5	93	71	83	76	84.8	85.5	4.08	103.6	0.82	15	13	4			195.00	6.50	50
Kroh, Perak ...	87.8	70.9	79.3	94	66	79	73	82.4	83.0	10.39	263.9	2.16	22	19	6	4		192.00	6.40	52
Temerloh, Pahang ...	90.0	73.3	81.6	94	69	85	76	85.2	85.6	6.75	171.5	2.26	11	11	1	2		205.25	6.84	56
Kuala Lipis, Pahang ...	89.5	72.3	80.9	96	69	84	74	84.1	84.5	10.73	272.5	2.31	18	13		17		188.40	6.28	51
Kuala Pahang, Pahang ...	87.2	74.6	80.9	90	71	83	77	85.3	85.2	8.11	206.0	1.98	14	13	2			243.65	8.12	67
Mount Faber, Singapore ...	87.9	74.3	81.1	92	70	82	77	82.2	82.4	4.33	110.0	0.93	17	13	6			169.00	5.63	46
Butterworth, Province Wellesley ...	87.8	74.8	81.3	91	72	80	77	85.3	85.6	9.23	234.4	3.26	15	14	1			219.60	7.32	60
Bukit China, Malacca ...	85.3	74.0	79.7	89	71	81	76	82.7	83.9	8.85	224.8	2.69	20	18	8			190.45	6.35	52
Kluang, Johore ...	87.8	71.5	79.7	92	69	80	73	81.7	82.0	9.45	240.0	2.80	22	17	8	15		157.05	5.23	43
Bukit Lalang, Mersing, Johore	86.8	72.5	79.7	91	70	83	78	82.2	81.7	4.16	105.7	0.80	15	12	1			188.15	6.27	51
Alor Star, Kedah ...	90.2	74.2	82.2	93	71	85	77	86.4	85.8	8.41	213.6	2.12	16	11	13	2		235.90	7.86	64
Kota Bahru, Kelantan ...	88.3	73.6	80.9	93	69	78	76	83.5	83.4	3.82	97.0	1.31	10	9				250.55	8.35	68
Kuala Trengganu, Trengganu	87.2	72.9	80.1	91	69	77	74	83.4	83.9	5.26	133.6	2.68	7	6	5			262.80	8.76	72
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft. Pahang ...	73.8	62.9	68.3	78	59	67	65	71.7	71.9	13.37	339.6	1.99	24	21	4	7		121.70	4.06	33
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	73.4	57.1	65.3	77	53	67	62	69.6	69.2	13.49	342.7	2.56	26	21	7	2		135.90	4.53	37
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	72.4	60.0	66.2	76	58	66	62			13.91	353.3	2.86	26	21	2			144.15	4.81	39

Compiled from Returns supplied by the Meteorological Branch, Malaya.